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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/822,944	03/30/2001	Harry Q. Pon	42390P10075	6606

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EXAMINER

ANDUJAR, LEONARDO

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 11/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/822,944	PON, HARRY Q.	
	Examiner	Art Unit	
	Leonardo Andújar	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>08/03</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Acknowledgment

1. The amendment filed on 08/14/2003, in response to the Office action mailed on 03/10/2003 has been entered. The present Office action is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 28-47.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 47 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification/drawings as originally filed do not disclose or describe an uninsulated bond wire touching an outer surface of insulating material of the insulated bond wire.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 28-31, 34-39 and 42-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takiar (US 5,422,435, previously cited) in view of MICROBONDS (WO 98/264452, cited by applicant).

6. Regarding claim 28, Takiar (e.g. fig. 5) shows most aspects of the instant invention including an apparatus comprising:

- A first integrated circuit 148;
- A second integrated circuit 150 residing on top of the first integrated circuit;
- A first and second bond wires connecting the first integrated circuit to the second integrated circuit.

7. Takiar does not disclose that the first and second bond wires are insulated. MICROBONDS shows a semiconductor device apparatus comprising insulated bond wires. According to MICROBONDS, the use of insulating wires increases the input/output pad density and flexibility for integrated circuit design since the number of bond pads is not limited to the periphery of the chip (abstract). Note that the use of insulated bond wires alleviates the problem of short circuiting that occur when fine bare wires are stitched closely adjacent to one another "small pitch" (page 3/figs. 19-31). Therefore, the chip layout can be optimized. It would have been obvious to one of ordinary skill in the art at the time the invention was made to insulated the bond wires disclosed by Takiar in order to increase the input/output pad density and to avoid short circuit problems associated with small pitch as taught by MICROBONDS.

8. Regarding claim 29, Takiar MICROBONDS shows that a first insulated bond wire crossing a second insulated bond wire (e.g. MICROBONDS' fig. 7).
9. Regarding claim 30, Takiar in view of MICROBONDS teaches that an outer surface of an insulation layer of the first insulated bond wire (e.g. MICROBONDS' fig. 13) may contact the second integrated circuit (MICROBONDS' e.g. fig. 7).
10. Regarding claim 31, Takiar MICROBONDS teaches that the first insulated has a tight bond wire pitch angle (e.g. MICROBONDS' fig. 6).
11. Regarding claim 34, MICROBONDS teaches that the bond wires may comprise aluminum (abstract).
12. Regarding claim 35, Takiar that the first, second integrated circuit, and the first and second insulated bond wires reside within a plastic mold (e.g. Takiar's fig. 1).
13. Regarding claim 36, MICROBONDS teaches that an outer surface of an insulation layer of the first insulated bond wire contacts an outer surface of an insulation layer of the second insulated bond wire (e.g. fig. 7/pg. 7/figs. 6-12).
14. Regarding claim 37, Takiar shows that the first and second integrated circuits include bond pads connected to the wires (e.g. fig. 5).
15. Regarding claim 38, Takiar shows a substrate 146 or 152 (e.g. fig. 5).
16. Regarding claim 39, Takiar (e.g. fig. 5) shows most aspects of the instant invention including an integrated circuit assembly comprising a plurality of stacked integrated circuits (146, 148, 150) electrically couple by a plurality of bond wires. Takiar does not disclose that the bond wires are insulated. MICROBONDS shows a semiconductor device apparatus comprising insulated bond wires. According to

MICROBONDS, the use of insulating wires increase the input/output pad density and flexibility for integrated circuit design since the number of bond pads is not limited to the periphery of the chip (abstract). Note that the use of insulated bond wires alleviates the problem of short circuiting that occur when fine bare wires are stitched closely adjacent to one another "small pitch" (page 3/lls. 19-31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to insulated the bond wires disclosed by Takiar in order to increase the input/output pad density and to avoid short circuit problems associated with small pitch as taught by MICROBONDS.

17. Regarding claim 42, MICROBONDS shows that the plurality of bonds wires includes bond wires that cross over each other (e.g. fig. 7).

18. Regarding claim 43, Takiar shows a plurality of staked integrated circuits (e.g. 5) whereas MICROBONDS teaches that an outer surface of an insulation layer of the insulated bond wire (e.g. MICROBONDS' fig. 13) may contact another integrated circuit (MICROBONDS' e.g. fig. 7).

19. Regarding claim 44, Takiar shows a substrate 146 or 152 (e.g. fig. 5).

20. Regarding claim 45, Takiar (e.g. fig. 3) shows most aspects of the instant invention including an apparatus comprising:

- A first integrated circuit 76;
- A second integrated circuit 78 residing on top of the first integrated circuit;
- A first bond wires 112 connecting the first integrated circuit to the second integrated circuit.

- And an insulated bond wires 112 connecting the first integrated circuit to the second integrated circuit.

21. Takiar does not disclose that the first bond wires are insulated. MICROBONDS shows a semiconductor device apparatus comprising insulated bond wires. According to MICROBONDS, the use of insulating wires increase the input/output pad density and flexibility for integrated circuit design since the number of bond pads is not limited to the periphery of the chip (abstract). Note that the use of insulated bond wires alleviates the problem of short circuiting that occur when fine bare wires are stitched closely adjacent to one another "small pitch" (page 3/lls. 19-31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to insulated first bond wires disclosed by Takiar in order to increase the input/output pad density of the second integrated circuit since the placement of bonding pads is not limited to the periphery of the chip and to avoid short circuit problems associated with small pitch as taught by MICROBONDS.

22. Regarding claim 46, MICROBONDS teaches a bond wire crossing another bond wire (e.g. 7). MICROBONDS does not teach that one of the crossing bond wires is not insulated. However, it has been held that omission of an element (i.e. insulation) and its function in a combination where the remaining elements perform the same function as before involves only routine skill in the art. *In re Karlson*, 136 USPQ 184. The main objective of MICROBONDS invention is to avoid the short circuit problems that may occur between adjacent bond wires. The omission of the insulation in anyone of two adjacent bond wires (insulated/uninsulated) does not preclude the invention to perform

the same function as before since no short circuit occur. It would have been obvious to one of ordinary skill in the art at the time the invention was made to insulated only one of two adjacent bond wires, since it has been held that omission of an element (i.e. insulating material) and its function in a combination where the remaining elements perform the same function as before involves only routine skill in the art.

23. Regarding claim 47, MICROBONDS teaches a bond wire touching an outer surface of an insulated bond wire (e.g. fig. 7/pg. 7/lls. 6-12). MICROBONDS does not teach that one of the bond wires is not insulated. However, it has been held that omission of an element (i.e. insulation) and its function in a combination where the remaining elements perform the same function as before involves only routine skill in the art. *In re Karlson*, 136 USPQ 184. The main objective of MICROBONDS invention is to avoid the short circuit problems that may occur between adjacent bond wires. The omission of the insulation in anyone of two adjacent bond wires (insulated/uninsulated) does not preclude the invention to perform the same function as before since no short circuit occur. It would have been obvious to one of ordinary skill in the art at the time the invention was made to insulated only one of two adjacent bond wires, since it has been held that omission of an element (i.e. insulating material) and its function in a combination where the remaining elements perform the same function as before involves only routine skill in the art.

24. Claims 28, 29, 31-33, 35-42 and 44-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takiar (US 5,422,435, previously cited) in view of KOGYO (cited by Applicant).

25. Regarding claim 28, Takiar (e.g. fig. 5) shows most aspects of the instant invention including an apparatus comprising:

- A first integrated circuit 148;
- A second integrated circuit 150 residing on top of the first integrated circuit;
- A first and second bond wires connecting the first integrated circuit to the second integrated circuit.

26. Takiar does not disclose that the first and second bond wires are insulated. KOGYO shows a semiconductor device apparatus comprising insulated bond wires. KOGYO shows a bond wire including an insulating coating made of polyvinyl having a thickness of 0.4 micrometers. Also, KOGYO teaches that this type of wires are desirable in order to achieve a fine pitch bonding, not short circuits causing by touching wires, long loop wire bonding, cross bonding and standardization of lead frames. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a bond wire including an insulating coating such as polyvinyl and having a thickness of 0.4 micrometers in Takiar invention in order to achieve a fine pitch bonding, not short circuits causing by touching wires, long loop wire bonding, cross bonding and standardization of lead frames as taught by KOGYO.

27. Regarding claim 29, KOGYO teaches that the use of insulated bond wires permits cross bonding (see advantages).

28. Regarding claim 31, Takiar in view of KOGYO teaches that the first insulated has a tight bond wire pitch angle (KOGYO's fig. 2).

29. Regarding claims 32 and 33, KOGYO teaches that the first and second insulated bond wires are made of polyvinyl.

30. Regarding claim 35, Takiar that the first, second integrated circuit, and the first and second insulated bond wires reside within a plastic mold (e.g. Takiar's fig. 1).

31. Regarding claim 36, KOGYO teaches that an outer surface of an insulation layer of the first insulated bond wire contacts an outer surface of an insulation layer of the second insulated bond wire.

32. Regarding claim 37, Takiar shows that the first and second integrated circuits include bond pads connected to the wires (e.g. fig. 5).

33. Regarding claim 38, Takiar shows a substrate 146 or 152 (e.g. fig. 5).

34. Regarding claims 39-41, Takiar (e.g. fig. 5) shows most aspects of the instant invention including an integrated circuit assembly comprising a plurality of stacked integrated circuits (146, 148, 150) electrically couple by a plurality of bond wires. Takiar does not disclose that the bond wires are insulated. KOGYO shows a semiconductor device apparatus comprising insulated bond wires. KOGYO shows a bond wire including an insulating coating made of polyvinyl having a thickness of 0.4 micrometers. Also, KOGYO teaches that this type of wires are desirable in order to achieve a fine pitch bonding, not short circuits causing by touching wires, long loop wire bonding, cross bonding and standardization of lead frames. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a bond wire including an insulating coating such as polyvinyl and having a thickness of 0.4 micrometers in Takiar invention in order to achieve a fine pitch bonding, not short circuits causing by

touching wires, long loop wire bonding, cross bonding and standardization of lead frames as taught by KOGYO.

35. Regarding claim 42, KOGYO teaches that the use of insulated bond wires permits cross bonding (see advantages).

36. Regarding claim 44, Takiar shows a substrate 146 or 152 (e.g. fig. 5).

37. Regarding claim 45, Takiar in view of KOGYO shows most aspects of the instant invention (see paragraph 25). However, Takiar in view of KOGYO does not teach that one of the bond wires may be uninsulated. However, it has been held that omission of an element (i.e. insulation) and its function in a combination where the remaining elements perform the same function as before involves only routine skill in the art. *In re Karlson*, 136 USPQ 184. The main objective of KOGYO invention is to avoid the short circuit problems that may occur between adjacent bond wires. The omission of the insulation in anyone of two adjacent bond wires (insulated/uninsulated) does not preclude the invention to perform the same function as before since no short circuit occur. It would have been obvious to one of ordinary skill in the art at the time the invention was made to insulated only one of two adjacent bond wires, since it has been held that omission of an element (i.e. insulating material) and its function in a combination where the remaining elements perform the same function as before involves only routine skill in the art.

38. Regarding claim 46, KOGYO teaches that the use of insulated bond wires permits cross bonding (see advantages).

39. Regarding claim 47, KOGYO teaches that the use of insulated bond wires permits the contact between two bond wires (see advantages).

Response to Arguments

40. Applicant's some arguments regarding new added claims have been considered but are moot in view of the new ground(s) of rejection.

41. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). For example, the use of insulated bonding wires to optimize dice layout and to prevent short circuit between adjacent bonding wires is within the level of ordinary skill at the time the claimed invention was made as evidenced by KYGYO (cited by applicant, see advantages), EP0276940A (cited by applicant, see abstract), WO98/26452 (cited by applicant, see abstract) and JP03185742 (cited by applicant, see abstract).

Conclusion

42. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37

CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

43. Papers related to this application may be submitted directly to Art Unit 2826 by facsimile transmission. Papers should be faxed to Art Unit 2826 via the Art Unit 2826 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2826 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2826 Fax Center is to be used only for papers related to Art Unit 2826 applications.

44. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Leonardo Andújar** at **(703) 308-0080** and between the hours of 9:00 AM to 7:30 PM (Eastern Standard Time) Monday through Thursday or by e-mail via Leonardo.Andujar@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn, can be reached on (703) 308-6601.

45. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 305-3900**.

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46. The following list is the Examiner's field of search for the present Office Action:

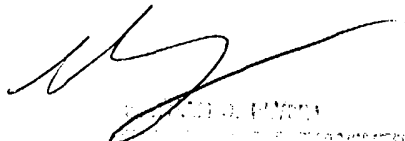
Field of Search	Date
U.S. Class / Subclass (es): 257/723, 782 and 786	11/03
Other Documentation:	
Electronic Database(s): East (USPAT, US PGPUB, JPO, EPO, Derwent, IBM TDB)	11/03

Leonardo Andújar

Patent Examiner Art Unit 2826

LA

11/11/03



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